

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

SIEMENS MEDICAL SOLUTIONS)	
USA, INC.,)	
)	
Plaintiff,)	
)	
v.)	Civ. No. 07-190-SLR
)	
SAINT-GOBAIN CERAMICS &)	
PLASTICS, INC.,)	
)	
Defendant.)	

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MEMORANDUM OPINION

Dated: May 15, 2009
Wilmington, Delaware


ROBINSON District Judge

I. INTRODUCTION

Plaintiff Siemens Medical Solutions USA, Inc. ("plaintiff") filed this action against defendant Saint-Gobain Ceramics & Plastics, Inc. ("defendant") on April 3, 2007, alleging infringement of U.S. Patent No. 4,958,080 ("the '080 patent"). (D.I. 1) Plaintiff is the exclusive licensee of the '080 patent; it is owned by Schlumberger Technology Corporation ("STC"). The '080 patent claims what has been described as a breakthrough in the field of medical imaging, that is, a gamma or x-ray detector that incorporates a particular scintillator.¹ This scintillator is crystalline, made of cerium-doped lutetium oxyorthosilicate ("LSO"). Plaintiff produces LSO scintillation crystals. Defendant manufactures lutetium-yttrium orthosilicate ("LYSO") scintillation crystals for use in medical scanners. Following a trial, on September 25, 2008, a jury found that defendant infringed the '080 patent and awarded \$52.3 million in damages. (D.I. 196) Currently before the court are defendant's motion for judgment as a matter of law or for a new trial and remittitur (D.I. 202) and plaintiff's motion for prejudgment interest (D.I. 203).

II. BACKGROUND

A. Technology and Patents at Issue

Positron emission tomography, also called "PET" imaging or a "PET" scan, is a type of nuclear medicine imaging. PET scanners create images by detecting gamma rays produced by a radioisotope after it is administered to a patient. Gamma rays are

¹A scintillator, generally, is a substance that absorbs high energy radiation and, in response, fluoresces photons at a specific, longer wavelength, releasing the previously absorbed energy.

converted into photons of visible light by scintillator crystals. These photons can be measured with photodetectors, resulting in the generation of a three-dimensional image of the area of the patient's body being scanned.

The '080 patent, which describes LSO crystals, was filed on August 4, 1989. The '080 patent generally claims X-ray and gamma ray detectors that incorporate LSO crystals.² LSO crystals, as described by the '080 patent, were generally recognized as the next scintillation crystal generation technology. (D.I. 20, ex. 3 at col. 1, l. 65-col. 2, l. 3; *id.*, ex. 4 at col. 2, ll. 28-44) As disclosed by the '080 patent, LSO crystals had improved scintillation properties, such as light output, energy resolution, scintillation decay time, and index of refraction, over prior art crystals. ('080 patent, col. 8, ll. 29-42 & Table 5) The '080 patent expired on October 6, 2008.

In contrast to the LSO crystals of the '080 patent, which contain only lutetium, defendant's LYSO crystals represent a 10% (by mole) substitution of the element yttrium for lutetium ("10% Y LYSO" crystals). LYSO crystals are the subject of U.S. Patent No. 6,624,420 ("the '420 patent") to Chai et al.³ The '420 patent is assigned to

²Claim 1 of the '080 patent reads:

1. A gamma ray or x-ray detector, comprising: a scintillator composed of a transparent single crystal of cerium-activated lutetium oxyorthosilicate having the general formulation $\text{Ce}_{2x}\text{Lu}_{2(1-x)}\text{SiO}_5$, where x is within the range of from approximately 2×10^{-4} to approximately 3×10^{-2} , and a photodetector optically coupled to the scintillator for producing an electrical signal in response to the emission of a light pulse by the scintillator.

³U.S. Patent No. 6,323,489 to McClellan ("the '489 patent"), assigned to the Regents of the University of California, was filed June 4, 1999 and issued November 27, 2001. The '489 patent claims a crystal scintillator comprising LYSO crystals. As the result of an interference action between the '489 patent and the application that issued as the '420 patent, which was filed on February 17, 2000 and issued September

the University of Central Florida and Crystal Photonics; Inc.; defendant's manufacture and sale of 10% Y LYSO crystals is licensed by the University. (D.I. 42 at ¶ 16)

Defendant sells 10% Y LYSO crystals under the tradename PreLude 420. Defendant's PreLude 420 crystals are incorporated into medical scanners manufactured by other companies. The "Gemini Raptor" and "Gemini TF"⁴-branded PET scanners sold by Philips, one of plaintiff's medical imaging competitors, utilize defendant's 10% Y LYSO crystals. (D.I. 19 at 4)

B. Prior Proceedings

At issue in this case was whether PET scanners incorporating 10% Y LYSO crystals meet the "scintillator"⁵ limitation of the asserted claims under the doctrine of equivalents. The parties did not dispute that PET scanners incorporating defendant's 10% Y LYSO crystals literally satisfy all of the remaining limitations of claims 1 and 2 of the '080 patent. With respect to the "scintillator" limitation, defendant conceded that its 10% Y LYSO crystals perform substantially the same function (detection of gamma and

23, 2003, the '489 patent was ultimately surrendered.

Claim 1 of the '420 patent reads:

A scintillator detector for high energy radiation comprising: a monocrystalline structure of cerium doped lutetium yttrium orthosilicate, $\text{Ce}_{2x}(\text{Lu}_{1-y}\text{Y}_y)_{2(1-x)}\text{SiO}_5$ where $x =$ approximately 0.0001 to approximately 0.05 and $y =$ approximately 0.0001 to approximately 0.9999.

⁴The Gemini TF scanner utilizes "time of flight" image correlation technology that enables a clearer image by measuring the time it takes photons to reach the detector.

⁵As construed by the court, "a transparent single crystal that responds to radiation by emitting observable light." A "single crystal" was, in turn, defined as "any solid object in which an orderly three-dimensional arrangement of the atoms, ions, or molecules is substantially repeated."

x-rays) as the scintillator limitation in the '080 claims, and emits protons when excited by the presence of either gamma or x-rays just as the claimed LSO crystals. The fulcrum issue, therefore, was whether defendant's 10% Y LYSO crystals represent a substantial difference over the claimed LSO crystals. Part of defendant's argument in this regard was that 10% Y LYSO crystals do not achieve substantially the same result as the scintillator limitation of the claims.⁶

A jury trial was held between September 17 and 25, 2008. Throughout the litigation, defendant asserted that it did not infringe (willfully or otherwise) the '080 patent under the doctrine of equivalents because it licenses LYSO crystals under the '420 patent. Defendant sought a jury instruction that the '420 patent was valid and unchallenged by plaintiff. Relying on *Festo Corp. v. Shoketsu Kogyo Kabushiki Co.*, 493 F.3d 1368 (Fed. Cir. 2007) (hereinafter "*Festo*"), defendant also sought a charge conveying that plaintiff's ability to demonstrate equivalency is "considerably more difficult," specifically, requiring that equivalence be shown by clear and convincing evidence. The court denied both requests during the course of the trial. Plaintiff's infringement evidence included documents wherein defendant's scientists used the term "equivalent" or "equal" in describing LSO and 10% Y LYSO crystals. Defendant attempted to distance itself from its documents by arguing that its employees did not intend these terms to convey any legal (rather than general) significance. Both parties'

⁶To prove infringement by the doctrine of equivalents, a patentee must provide "particularized testimony and linking argument" as to the "insubstantiality of the differences" between the claimed invention and the accused product, or with respect to the function/way/result test. See *Texas Instruments Inc. v. Cypress Semiconductor Corp.*, 90 F.3d 1558, 1567 (Fed. Cir. 1996).

witnesses addressed the effects of 10% Y. For example, defendant's expert, Dr. McClellan, testified that 10% Y LYSO crystals display different optical properties than LSO crystals. Plaintiff admitted data showing a large similarity in scintillation properties and the testimony of its expert, Dr. Marvin Weber, who compared test results on both crystals and deemed them equivalent.

The jury was instructed that plaintiff must prove its contributory and inducement of infringement claims by a preponderance of the evidence. With respect to the '420 patent, the court further instructed:

[Y]ou have heard evidence that [defendant] has a license under the ['420] patent to produce its 10% Y LYSO crystal[s]. In connection with this evidence, I instruct you that a product that is covered by a subsequent patent may still infringe an earlier patent. Nonetheless, in considering the issue of infringement under the doctrine of equivalents, you may consider that [defendant] obtained the license under the ['420] patent, which may be some evidence that the differences between the 10% Y LYSO crystal[s] and the claimed LSO crystal[s] are substantial. Such evidence may be considered along with other evidence of the similarities and differences between the claimed LSO crystal[s] and [defendant's] 10% Y LYSO crystal[s]. It is for you to decide the issue of whether [defendant's] 10% Y LYSO crystal[s] constitute[] an equivalent to the claimed LSO crystal[s] of the '080 patent.

(D.I. 192 at 24) The jury ultimately found in favor of plaintiff on the issue of equivalence and awarded \$52.3 million in lost profits damages for defendant's infringement. (D.I. 196) However, the jury found that defendant's infringement was not willful. (*Id.*)

III. LEGAL STANDARDS

A. Motion for Judgment as a Matter of Law

To prevail on a renewed motion for judgment as a matter of law following a jury trial under Federal Rule of Civil Procedure 50(b), the moving party "must show that the jury's findings, presumed or express, are not supported by substantial evidence or, if

they were, that the legal conclusions implied [by] the jury's verdict cannot in law be supported by those findings.” *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1348 (Fed. Cir. 1998) (quoting *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 893 (Fed. Cir. 1984)). “‘Substantial’ evidence is such relevant evidence from the record taken as a whole as might be acceptable by a reasonable mind as adequate to support the finding under review.” *Perkin-Elmer Corp.*, 732 F.2d at 893. In assessing the sufficiency of the evidence, the court must give the non-moving party, “as [the] verdict winner, the benefit of all logical inferences that could be drawn from the evidence presented, resolve all conflicts in the evidence in his favor, and in general, view the record in the light most favorable to him.” *Williamson v. Consol. Rail Corp.*, 926 F.2d 1344, 1348 (3d Cir. 1991); *Perkin-Elmer Corp.*, 732 F.2d at 893. The court may not determine the credibility of the witnesses nor “substitute its choice for that of the jury between conflicting elements of the evidence.” *Id.* In summary, the court must determine whether the evidence reasonably supports the jury's verdict. See *Dawn Equip. Co. v. Kentucky Farms Inc.*, 140 F.3d 1009, 1014 (Fed. Cir. 1998).

B. Motion for a New Trial

The decision to grant or deny a new trial is within the sound discretion of the trial court and, unlike the standard for determining judgment as a matter of law, the court need not view the evidence in the light most favorable to the verdict winner. See *Allied Chem. Corp. v. Darflon, Inc.*, 449 U.S. 33, 36 (1980). Federal Rule of Civil Procedure 59(a) provides, in pertinent part:

A new trial may be granted to all or any of the parties and on all or part of the issues in an action in which there has been a trial by jury, for any of

the reasons for which new trials have heretofore been granted in actions at law in the courts of the United States.

New trials are commonly granted in the following situations: (1) where the jury's verdict is against the clear weight of the evidence, and a new trial must be granted to prevent a miscarriage of justice; (2) where newly-discovered evidence surfaces that would likely alter the outcome of the trial; (3) where improper conduct by an attorney or the court unfairly influenced the verdict; or (4) where the jury's verdict was facially inconsistent. *See Zarow-Smith v. N.J. Transit Rail Operations*, 953 F. Supp. 581, 584 (D.N.J. 1997) (citations omitted). The court, however, must proceed cautiously and not substitute its own judgment of the facts and assessment of the witnesses' credibility for the jury's independent evaluation. Nevertheless,

[w]here a trial is long and complicated and deals with a subject matter not lying within the ordinary knowledge of jurors a verdict should be scrutinized more closely by the trial judge than is necessary where the litigation deals with material which is familiar and simple, the evidence relating to ordinary commercial practices. An example of subject matter unfamiliar to a layman would be a case requiring a jury to pass upon the nature of an alleged newly discovered organic compound in an infringement action.

Lind v. Schenley Indus. Inc., 278 F.2d 79, 90-91 (3d Cir. 1960).

IV. DISCUSSION

A. Jury Charge

Defendant asserts that *Festo* calls into question whether defendant's crystal can simultaneously be protected under a valid patent (the '420 patent) and constitute a legal equivalent of another patent (the '080 patent). (D.I. 212 at 4) In defendant's view, plaintiff was required to prove that its 10% Y LYSO crystals are insubstantially different

from the '080 patent claims under the higher "clear and convincing" standard of proof. (*Id.*) Defendant freely admits that it cannot cite a case requiring infringement to be proven by clear and convincing evidence; defendant seeks Federal Circuit review of its argument as a matter of first impression. (D.I. 230 at 5) The court finds defendant's position untenable and declines to be the first (and only) court to depart from an extended history of patent infringement jurisprudence applying the preponderance of the evidence standard.

Festo addressed the question of when an equivalent is foreseeable and subject to surrender under the doctrine of prosecution history estoppel. *Festo* argued in that case that the patentee should be permitted to capture unclaimed equivalents "because at the time the patent was prosecuted those equivalents were unknown and the device incorporating those equivalents was thought to be substantially different from the device with the features claimed in the patent before the amendment" was made. 493 F.3d at 1379. Against this backdrop, the Federal Circuit noted that it

ha[s] not directly decided whether a device – novel and separately patentable because of the incorporation of an equivalent feature – may be captured by the doctrine of equivalents, although [it has] held that when a device that incorporates the purported equivalent is in fact the subject of a separate patent, a finding of equivalency, while perhaps not necessarily legally foreclosed, is at least considerably more difficult to make out. But there is a strong argument that an equivalent cannot be both non-obvious and insubstantial.

Id. at 1379-80 (internal footnotes omitted). The Federal Circuit continued, stating that, even assuming that *Festo*'s argument was consistent with the purpose of the doctrine of equivalents, "the foreseeability requirement does not require the knowledge that the equivalent would satisfy the function/way/result test or the insubstantial differences test." *Id.* at 1380.

The Federal Circuit did not hold in *Festo* that a clear and convincing standard should apply when determining whether a product that is covered by a separate patent infringes another patent under the doctrine of equivalents. The language upon which defendant relies was propounded in the context of clarifying which equivalents may be “foreseeable.” Notwithstanding, the *Festo* Court specifically cited prior opinions in its discussion holding that “separate patentability does not automatically negate infringement.” *Id.* at 1380 n.8 (citing *Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F. 3d 1575, 1582 (Fed. Cir. 1996) and *National Presto Indus., Inc. v. West Bend Co.*, 76 F. 3d 1185, 1191 (Fed. Cir. 1996)). Further, the Court noted that it has previously explained that, where an accused device is separately patented, “the PTO must have considered the accused product to be nonobvious with respect to the patented composition” and “the issuance of that patent is relevant to the equivalence issue.” *Id.* at 1330 n.9 (citing *Hoganas AB v. Dresser Indus., Inc.*, 9 F. 3d 948, 954 (Fed. Cir. 1993) and *Zygo Corp. v. Wyco Corp.*, 79 F. 3d 1563, 1570 (Fed. Cir. 1996) (same)).

The court’s instruction to the jury in this case took this authority into account. The instruction did not foreclose the possibility that 10% Y LYSO crystals can infringe the ‘080 patent and permitted the jury consider the ‘420 license along with other evidence regarding the similarities and differences of LSO and 10% Y LYSO crystals. This instruction is consistent with *Festo* and did not result in a miscarriage of justice warranting a new trial.

B. Exclusion of the ‘489 Patent and Jury Instructions Regarding Validity

Defendant’s expert, Dr. McClellan, is the named inventor on the ‘489 patent.

Assigned to the Regents of the University of California, the '489 patent was filed June 4, 1999 and issued November 27, 2001. The '489 patent claimed a crystal scintillator comprising LYSO crystals. As the result of an interference action between the '489 patent and the application that issued as the '420 patent, which was filed on February 17, 2000 and issued September 23, 2003, the '489 patent was ultimately surrendered.

Defendant argues that it is entitled to a new trial for the court's exclusion of relevant and admissible evidence regarding the '489 patent. At trial, defendant stated that the '489 patent was "important to tell the full story of what it was that [defendant] did," in other words, that defendant actively pursued a license to the '489 patent, first through the inventor, Dr. McClellan, and subsequently through the University of California. After defendant formalized a license under the '489 patent, the PTO declared the interference with the '420 patent, and the University of California forfeited its rights. (*Id.* at 581:24-582:6) Defendant then rescinded its license to the '489 patent and pursued and obtained a license under the '420 patent. (*Id.*) Counsel stated:

There's a willful infringement case here. We have to show that we consistently pursued the intellectual property rights. . . It is not the foundation of any argument that says, let's look and read the specification and let's look at the claims. We took a license for LYSO.

(D.I. 208 at 575:4-576:24)

The court stated that "the important thing is that [defendant was] pursuing licenses," and defendant could "pursue [its] line without actually admitting the patent," insofar as the "actual patent upon which the license rests is [not] necessarily relevant given the fact that the patent ended up not being one that has any import in this case." (*Id.* at 577:4-16) Put another way, the license is the important evidence concerning

defendant's lack of willfulness, not the actual patent upon which it was based. (*Id.* at 579:1-9, 580:17-581:15) The court ultimately permitted testimony regarding defendant's licensing efforts, including the admission of the '489 license, but excluded the abandoned '489 patent itself under F.R.E. 403. (*Id.* at 580:20-25 ("The patent is confusing. Other than the fact that the license is issued on it, there is no relevance to it. Minimal relevance to it. And there is a high likelihood of confusion to the jury[.]"))

In its post-trial papers, defendant now takes the position that it sought to offer the '489 patent as "evidence of the patentability of LYSO [crystals] and the work that led to the invention." (D.I. 212 at 12) That is, the '489 patent demonstrates that the PTO allowed a patent to LYSO crystals over LSO crystals. Defendant argues that the court's ruling rendered it unable to rebut statements in plaintiff's rebuttal closing argument that the PTO had never "looked at" LYSO crystals.

As an initial matter, defendant argued to the jury throughout trial that the PTO issued the '420 patent after having considered the '080 patent as prior art. (D.I. 205 at 156:18-157:16; D.I. 208 at 808:12-20; D.I. 210 at 1222:9-15, 1224:12-24, 1246:24-1247:5) Even had defendant offered the '489 patent for this purpose, it would have been cumulative of evidence already on the record – the '420 patent. However, despite its current representation that the '489 patent was "critical" to its case, defendant did not offer the '489 patent for a disclosure of LYSO crystals. Having never informed the court that the '489 patent was relevant to its equivalents argument,⁷ defendant cannot now

⁷Defendant's reliance on the '489 patent in its preliminary injunction briefing, filed October 17, 2007, is not, as defendant asserts, a "signal[]" that it intended to admit the '489 patent at trial (in September 2008). (D.I. 230 at 15) The fact that Dr. McClellan's expert report (containing a proffer on the '489 patent) was before the court on motions

argue that the court's ruling was unsound. The court notes that defendant ultimately succeeded in defeating plaintiff's willfulness charge based upon the admitted evidence, the basis of its original proffer. A new trial is not warranted on this ground.

The court next addresses the tangential issue of its final jury instructions. The court declined to instruct the jury on the presumption of validity insofar as validity was not before the jury. However, the court permitted defendant to affirmatively state on the record that the '420 patent is presumed valid; defendant emphasized this point in its closing argument. (D.I. 210 at 1204:24-1206:13; 1222:9-15; 1246:24-1247:2) In response, plaintiff made what defendant characterizes as a series of insinuations casting doubts on the validity of the '420 patent during its closing argument. Plaintiff's counsel stated that Dr. Chai did not make LYSO crystals and did not provide the PTO with data on that range for evaluation, questioned whether the '420 patent would "support these claims at all," and noted that the owner of the '420 patent (the University of Central Florida) was not willing to give defendant a warranty that it did not infringe the '080 (LSO) patent. (D.I. 210 at 1528:3-4; 1262:8-19; 1263:10-1264:15)⁸ Plaintiff appropriately stopped short of directly challenging the validity of the '420 patent.

The jury was instructed at the beginning of this case that the PTO is presumed to

practice is not adequate notification. (*Id.* at 18)

⁸Plaintiff's counsel stated: "Mr. Whitmer said – I wrote this down – the Patent Office thought [10% Y] was substantially different. Not true. The Patent Office never looked at the crystal in this case because they never had any data on it in this patent application from Mr. Chai." (*Id.* at 1263:11-15)

All of the cited excerpts are all representative of comments made by the parties throughout the trial.

have done its job correctly.⁹ (D.I. 205 at 102:4-6) As previously indicated, the court provided a final instruction inviting the jury to consider defendant's license under the '420 patent in its equivalence analysis, further confirming that the '420 patent stands as valid. (D.I. 192 at 24) Defendant complains that the court's final jury instruction that attorneys' arguments are not "evidence" diminished any effect of its statements regarding the presumption of validity. (D.I. 230 at 10) Assuming this was the case, so too would plaintiff's counsel's statements regarding the strength of the '420 patent have been negated.

In view of the foregoing, the court does not find that its ruling excluding a specific validity jury instruction (concerning a non-asserted patent) resulted in a miscarriage of justice, or that plaintiff's counsel engaged in improper conduct that unfairly influenced the verdict.¹⁰ Plaintiff was entitled to generally challenge defendant's license defense to willfulness, and it did not do so inappropriately in the court's view.

C. Exclusion of Portions of Dr. McClellan's Testimony

Dr. McClellan theorized that "LYSO is a unique material with compositional-dependent properties that to varying degrees differ from those of LSO" (D.I. 146 at ¶ 8), in other words, LYSO crystals have different properties in different applications.

Defendant asserts that the court erred in granting plaintiff's motion to exclude portions

⁹The court utilizes the video, "An Introduction to the Patent System," distributed by the Federal Judicial Center, which provides an overview of validity.

¹⁰Although most of defendant's arguments are made for a new trial, defendant seeks judgment as a matter of law that the jury's finding of equivalence on a preponderance of the evidence standard without a pronouncement of the validity of the '420 patent renders the verdict unsustainable. (D.I. 212 at 26) The court denies defendant's JMOL motion.

of Dr. McClellan's testimony relating to: (1) uses, other than in PET scanners, for 10% Y LYSO crystals; (2) scintillation properties for gamma ray and x-ray detectors; and (3) manufacturing advantages of LYSO crystals over LSO crystals.¹¹ In Dr. McClellan's opinion, "several key characteristics for the PET machines . . . are in the same range," while this is not the case with, for example, gamma ray and x-ray detectors. (*Id.* at ¶¶ 8, 9)

As an initial matter, the court did not render a specific ruling regarding the substance of Dr. McClellan's testimony. The court granted plaintiff's motion in limine to exclude those portions of Dr. McClellan's proffered testimony that were not disclosed in discovery. More specifically, the court struck portions of Dr. McClellan's expert opinion relying upon and relating to studies he performed at Los Alamos National Laboratories ("LANL"), insofar as Dr. McClellan did not review LANL documents prior to propounding his expert opinion and was not permitted to produce supporting confidential LANL documents in discovery. (D.I. 160) At trial, the court reiterated that "there [were] two limitations on Dr. McClellan's proffered testimony. Obviously, his expert report and depositions and the fact that he cannot rely on testing, the results of which were not given to plaintiff through discovery." (D.I. 209 at 964:11-15) The court discerns no error in its ruling.

Defendant argues that testimony regarding other uses for scintillators would have broadened the jury's focus from three main scintillation properties that matter for purposes of considering the differences between the two patented crystals in PET

¹¹The court also excluded testimony regarding manufacturing advantages from defendant's expert Joel Karp.

systems (light output, decay time, and density) to other properties differing between the crystals in other applications (e.g., light output, radioactive background, emission wavelength, and afterglow). (D.I. 212 at 21) As PET scanners were the only products at issue in this infringement litigation, the relevance of such testimony is questionable. Notwithstanding, the court notes that Dr. McClellan did testify at trial that the differences between LSO and 10% Y LYSO crystals with respect to the following properties are not insubstantial: light output; radioactive background; density; emission wavelength; and afterglow. (D.I. 209 at 982:13-986:22) Defendant admits as much in its papers. (D.I. 230 at 12-13 (citing elicited testimony regarding “differences between 10% Y LYSO and LSO [crystals] at the molecular level,” including overall optical properties, background glow, emission spectra, and melting point advantages). Dr. McClellan provided this testimony in spite of the fact that the cited portions of Dr. McClellan’s expert report contain no proffer regarding whether any differences in properties (or overall crystal performance) were “substantial.”¹² (D.I. 212 at 17-21, citing D.I. 146, p. 6-8)

Defendant offers only cursory arguments with respect to the manufacturing advantages of LYSO crystals over LSO crystals. Defendant does not indicate where in its pre-trial disclosures its experts opined that any differences in the manufacturing processes are “substantial.” (D.I. 212 at 21) The ‘080 patent does not claim a manufacturing process, and defendant provides no authority for its argument that

¹²Additionally, no experimental data was cited by Dr. McClellan regarding these properties. Dr. McClellan stated that “[d]etailed designs and their respective performance optimization is not given, rather[,] the applications are reviewed at a high level simply to illustrate that ‘equivalence’ tests for two current PET systems . . . does not establish the alleged infringement of the ‘080 patent by [defendant’s] LYSO [crystals].” (D.I. 146 at ¶ 13)

manufacturing properties are relevant to the issue of equivalence. (*Id.*) At trial, the court ruled that evidence regarding manufacturing properties is not relevant to the infringement analysis. (D.I. 205 at 143:10-16)¹³ The court discerns no error in its ruling.

D. Submission of Lost Profits to the Jury

Defendant asserts that it was error to permit the jury to consider lost profits and, in any event, the jury's verdict cannot stand as a matter of law because it speculated as to the number of infringing PET units sold by defendant's customer, Philips. The court will address these arguments in turn.

1. Lost profits remedy

To recover lost profits damages, plaintiff was required to demonstrate that, "but for" the infringement, it would have made the sales that were made by defendant.

Rite-Hite Corp. v. Kelley Co., Inc., 56 F.3d 1538, 1545 (Fed. Cir. 1995).

In making a case for lost profits, [plaintiff] need only show a reasonable probability that it would have made additional profits "but for" the infringement. Although [plaintiff] must support [its] positions with sound economic proof, absolute certainty is not required, for reconstruction of the "but for" market is "by definition a hypothetical enterprise" based on the evidence introduced at trial.

Fiskars, Inc. v. Hunt Mfg. Co., 279 F.3d 1378, 1383 (Fed. Cir. 2002) (internal citations omitted). The Federal Circuit has adopted a four-factor test, first articulated in *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152 (6th Cir.1978), as a standard, non-exclusive method for a patentee to establish entitlement to lost profits damages.

¹³The court did not foreclose defendant's offering of evidence of manufacturing differences in the context of lost profits damages. Defendant was ultimately foreclosed from offering this evidence in its damages case insofar as its damages experts had not raised the issue their reports. (D.I. 208 at 574:9-24)

Under the *Panduit* test, plaintiff must prove: (1) demand for the patented product; (2) absence of acceptable non-infringing substitutes;¹⁴ (3) manufacturing and marketing capability to exploit the demand; and (4) the amount of the profit it would have made. *Id.*

In situations where there are only two suppliers in the market, the first two *Panduit* factors collapse. “In the two-supplier market, it is reasonable to assume, provided the patent owner has the manufacturing and marketing capabilities, that it would have made the infringer’s sales. In these instances, the *Panduit* test is usually straightforward and dispositive.” *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 883 F.2d 1573, 1577 (Fed. Cir. 1989) (citations omitted).

The only of the *Panduit* factors contested in this case are non-infringing alternatives and the amount of profits. Defendant asserts that plaintiff is not entitled to lost profits because it did not satisfy its burden to prove that “but for” defendant’s supply of 10% Y LYSO crystals to Philips, plaintiff would have made all of defendant’s sales. (D.I. 212 at 31) Defendant’s basis is that: (1) the relevant market consists of three major sellers (plaintiff, Philips, and GE); and (2) defendant presented evidence of several non-infringing alternatives.

Plaintiff established at trial that the PET scanner sold by GE is based on bismuth germinate (“BGO”) scintillation crystals. (D.I. 206 at 283:17-22; 425:9-13; D.I. 207 at 555:13-19) Dr. Melcher, inventor of the ‘080 patent, testified that BGO crystals

¹⁴As discussed previously, defendant did not challenge plaintiff’s evidence regarding the lack of non-infringing alternatives in its Rule 50(a) motion; the court does not consider defendant’s Rule 50(b) motion on this ground.

have inferior properties compared to LSO and 10% Y LYSO crystals, specifically, low light output and slow decay time – two principal optical properties in PET scanners. (D.I. 205 at 174:25-175:3 (BGO crystals are “one of the best” in terms of density but has low light output and slow decay time)) Plaintiff also points to other testimony of record regarding the general inferiority of BGO crystals vis a vis LSO crystals. (*Id.* at 194:20-24 (BGO crystals “simply [do not] have the . . . adequate properties” compared to LSO); D.I. 206 at 228:4-13 (“LSO [crystals] provided performance advantages over the previous generation of crystals”); 425:21-426:3 (BGO crystals have a “dramatically longer” acquisition time); 445:3-5 (BGO crystals’ scan times may be three times as long)) LSO and 10% Y LYSO crystals can be used for “time of flight” calculations, resulting in a clearer image, while BGO crystals cannot be. (D.I. 209 at 945:16-18; 1032:19-22; PTX 125 at 14) Marcus Lusser, plaintiff’s head of marketing and sales, also testified that plaintiff’s LSO-based scanner provides much better image quality than those based on BGO crystals. More specifically, due to this difference, BGO-based scanners do not compete with plaintiff’s LSO-based scanners in the so-called “high-end” PET scanner market, or the market of purchasers looking for the highest performance (for example, major universities). (D.I. 206 at 429:16-430:7)

A reasonable jury could have inferred from the foregoing that the allegedly infringing product (Philips’ “Gemini TF” or time of flight scanner) and plaintiff’s LSO-based scanners comprise a market segment of their own. Defendant’s witnesses confirmed the existence of a high-end PET scanner market in their testimony. Eric Virey, one of defendant’s chief scintillation technology scientists and spearhead on the

10% Y LYSO crystals project, testified¹⁵ that LSO crystals provide performance advantages over the prior generation of crystals, and defendant wanted to break in to the “high end PET scanner[]” market by coming up with its own “lutetium-based crystal or next generation crystal” and finding a customer willing to introduce a “next generation scanner” with that crystal. (D.I. 206 at 228:11-20) Mr. Dominique Rothan, who was responsible for marketing defendant’s 10% Y LYSO crystals, also acknowledged a “high-end” PET market separate and apart from the “general” PET market, and a customer movement towards that high-end market in recent years. (e.g., D.I. 207 at 492:11-19) Dr. Michael Mayhugh, defendant’s technology director, confirmed that defendant sought to introduce LYSO to compete in the high-end PET market. (D.I. 208 at 720:6-9; 747:13-22) Defendant’s documents generally follow suit. (e.g., PTX-107A at SGCP1652 (“We want to be present in the high-end PET segment. Our best strategy is to work on LYSO.”)) Defendant’s damages expert, Mr. John Jarosz, agreed that there is a high-end segment in the overall PET market, but opined that this high-end segment is made up of LSO, LYSO, and GSO¹⁶ crystal-based scanners. (D.I. 209 at 1102:12-1103:10) Plaintiff’s damages expert, Ms. Mary Woodford, opined that only LSO and LYSO-based scanners constitute the high-end market. (D.I. 208 at 615:2-5)

The court addresses at this juncture plaintiff’s evidence regarding GSO crystals and lanthanum bromide, the other non-infringing alternatives asserted by defendant. Like BGO, GSO crystals cannot be used for time of flight measurements (like LSO and

¹⁵By deposition.

¹⁶GSO crystals are another scintillator used in PET applications.

LYSO crystals can). (D.I. 207 at 480:2-6; D.I. 209 at 945:16-20; 1032:19-22) Evidence adduced at trial indicated that Philips switched from using GSO crystals to defendant's 10% Y LYSO crystals for its high-end "Gemini TF" time of flight scanner, to achieve what it deemed the "next level of performance." (D.I. 207 at 453:5-12; *see also* PTX-76 (Philips' "PET Project Manager" Alan Love reflecting that "GSO doesn't quite cut it."); PTX-120 ("Philips has embarked on an initiative that will bring our PET products into a new era of performance. Key to this initiative is the use of lutetium crystals as a base for enhancing product performance.")) Plaintiff introduced evidence that, in addition to lacking time of flight capabilities, GSO crystals have generally inferior optical properties to LSO crystals. (D.I. 205 at 194:20-24 (GSO and BGO crystals do not have "adequate properties" for high-end scanning); D.I. 206 at 241:21-25 ("no one would choose GSO" given a table of GSO and LSO crystals' characteristics); PTX-112A (same); 287:17-21 (GSO and BSO crystals are not competitive to lutetium-based crystals)) A Philips' Gemini TF PET system presentation contains a comparative chart, demonstrating the superiority of LSO and 10% Y LYSO crystals over GSO and BGO crystals in several areas. (PTX-125 at 14 ("LYSO [was] selected because of timing resolution, stopping power and availability"))

Plaintiff also introduced evidence that Philips chose 10% Y LYSO crystals over lanthanum bromide ("LaBr"), another asserted alternative, because it believed lanthanum bromide was at least a year and a half behind in development. For example, a Philips "PET Advanced Development" memo noted in 2003 that

[t]wo new scintillators are under consideration for [time of flight]. LYSO, an analog of LSO, can be produced in high quantity with a 12-18 month ramp-up time, at low risk, using existing growth and fabrication techniques. LaBr is a

promising new scintillator with better timing and energy resolution than LYSO, but with lower stopping power. Commercial production of LaBr is uncertain, but is believed to be at least three years in the future.

(PTX 6 at PH614; see also D.I. 207 at 455:2-456:7 (time to market was important to Philips, justifying the selection of 10% Y LYSO crystals)) Clinical testing of a lanthanum bromide-based PET scanner had not occurred as of trial. (D.I. 208 at 780:10-23) Thus, there was evidence of record that LaBr was not “available in the market” and, therefore, not a viable non-infringing alternative. See *Grain Processing Corp. v. American Maize-Products Co.*, 185 F.3d 1341, 1349-50 (Fed. Cir. 1999) (“[T]o be an acceptable non-infringing substitute, the product or process must have been available or on the market at the time of infringement.”) (citation omitted) (holding that two-week production lag-time did not defeat “but for” causation for purposes of establishing lost profits damages).¹⁷

Notwithstanding, plaintiff also adduced evidence that lanthanum bromide had disadvantages. For example, LaBr was “far faster” and “brighter” but had a lower density, resulting in higher costs. (D.I. 209 at 928:25-929:9; 940:2-941:12; 952:4-15; see also D.I. 206 at 264:25-265:3) Meeting minutes from a discussion with Philips indicates that twice as much LaBr is needed than LYSO “due to [a] difference in stopping power.” (PTX-57¹⁸) Plaintiff also introduced evidence that lanthanum bromide is hygroscopic, in other words, that it takes up moisture – another undesirable property.

¹⁷The jury was instructed that “[t]o be a non-infringing substitute, a product must be both (1) available in the market, and (2) acceptable to the market.” (D.I. 192 at 38)

¹⁸Other “LaBr issues” were listed as including “cracking, starting 6” growths, [and] high furnace cost[.]”

(D.I. 209 at 937:23-938:7; 952:10-13) Frank Valentino, Philips' vice president of nuclear medicine, testified that the availability of LaBr in addition to its inferior density and hydroscopic nature all impacted Philips' decision to select defendant's 10% Y LYSO crystals. (*Id.* at 952:4-15)

Based on the foregoing, and taking all logical inferences in plaintiff's favor, a reasonable jury could have found that a high-end PET market exists, and there are no viable non-infringing alternatives to LSO and LYSO crystal scintillators in this market. Alternatively, the jury may have found a relevant market (high-end PET scanners) containing only two suppliers (plaintiff and defendant). A lost profits award was proper on either basis.

2. Quantum of damages

Having found that the evidence supports the jury's award of lost profits damages, the court turns next to the amount of that verdict. The main disagreement between the parties in this respect is the appropriate number of Philips' PET scanners upon which the damages award should be based.

Plaintiff demonstrated at trial that defendant sold 79 scanners' worth of 10% Y LYSO crystals to Philips before the '080 patent expired. (PTX-345; D.I. 207 at 526:1-529:8; 551:7-19) Mr. Jarosz did not contest this number of crystals, only the number of infringing scanners. Both parties' experts agree that at least 61 scanners were sold by Philips. Mr. Jarosz testified that "61 is the sales in the marketplace, according to Philips' records. They had records through May of 2008 of 49 sales. I then extrapolated, based on past performance, what they're going to sell through September of 2008, and that equals 61 scanners in the marketplace." (D.I. 209 at 1078:61-15)

Ms. Woodford confirmed that defendant's documents indicate that 61 scanners were **manufactured** by Philips with 10% Y LYSO crystals. (D.I. 208 at 658:3-660:11¹⁹) Ms. Woodford also conceded that, as of May 2008,²⁰ Philips had not sold 12 of these 61 manufactured units. (*Id.*) Matthew Bendick,²¹ Philips' controller for PET scanners and its designated corporate representative regarding sales of 10% Y LYSO PET scanners, agreed that "it's not in Philips' interest to hold a lot of inventory of crystals . . . [and Philips doesn't] want to buy all [its] supplies way in advance of when [it] need[s] them." (D.I. 207 at 463:16-23) The crystal component of Philips' scanners is a large part of the cost of making the scanner. (*Id.*) Based on this evidence, plaintiff's theory is that Philips' did not hold any of these crystals in inventory – all 79 crystals were incorporated into infringing scanners.

Ms. Woodford's ultimate conclusion was that plaintiff was due \$55.3 million in damages: \$45.7 million of lost profits based on the 79 scanners,²² and \$9.6 million in lost service contracts. (D.I. 208 at 624:16-626:3-10) Mr. Jarosz calculated lost profits damages based on 61 units at \$15.5 million. (D.I. 209 at 1079:9-12) The jury awarded \$52.3 million – \$3 million less than Ms. Woodford's valuation.

On the record at bar, the court finds that plaintiff did not meet its burden show a reasonable probability that, "but for" the infringement, it would have sold 79 PET

¹⁹The court notes that the copies of the business records (charts) admitted as DTX-283 to 285 are illegible.

²⁰The '080 patent expired shortly after trial in October 2008.

²¹Testifying by deposition.

²²Breaking down to "almost \$580,000 [profit] per scanner." (D.I. 208 at 625:1)

scanners. There is no dispute that 49 scanners were sold. Mr. Jarosz himself projected that 61 infringing scanners were sold by September 2008. (D.I. 209 at 1078:61-15) Because the experts truly did not dispute this point, and in view of the testimony that it is generally not cost-efficient to stockpile crystals, the jury could have reasonably concluded that 61 infringing scanners were both made and sold prior to the expiration of the '080 patent.

Absent agreement by the experts, the only evidence before the jury regarding the additional 18 scanners was that Philips generally did not stockpile crystals and, therefore, incorporated them into infringing PET scanners. However, plaintiff points to no evidence of record that the additional 18 scanners were sold prior to October 2008.

Plaintiff sought an inference that the scanners were sold based on evidence that defendant and Philips have a working business relationship insofar as Philips is defendant's major PET scanner customer (D.I. 207 at 452:13-15; PTX-17), and Philips' sales spreadsheets would not reflect sales of scanners unless the revenue for those scanners had actually been booked, as compared to a sold scanner awaiting delivery and payment (D.I. 207 at 464:3-10).²³ Even resolving any doubts about the reasonable certainty of damages in favor of plaintiff, as the court must, the date of sale of the additional 18 scanners remains wholly speculative.

Ms. Woodford calculated the per-scanner profit to be \$578,969. (D.I. 208 at 625:1) For 61 scanners, this represents \$35,317,109. Ms. Woodford also calculated a

²³As indicated previously, the copies of DTX-283 to 285 submitted to the jury are illegible. Mr. Matthew Bendick, Philips' controller for PET systems, provided the cited testimony using PTX-130, a Philips spreadsheet. Plaintiff cites PTX-130 as an example of documentation differing from DTX-284 and 285. (D.I. 225 at 47)

lost profit on service contracts for units sold in the United States as \$343,587 per scanner; she applied this number to 28 scanners serviced in the United States for a resultant \$9,620,436 million in lost profits on service contracts.²⁴ (*Id.* at 625:11-13)

The court notes at this juncture that defendant, despite moving for remittitur in its papers, did not specify an appropriate amount of damages for 61 scanners based on the trial record or point to any evidence that the number of scanners located in the United States (28, by Ms. Woodford's testimony) would differ for 61 versus 79 scanners. The court finds that the jury verdict is supported up to \$44,937,545 based on Ms. Woodford's testimony.

E. Plaintiff's Motion for Prejudgment Interest

Section 35 U.S.C. § 284 provides for the calculation of damages "together with interest . . . as fixed by the court." Prejudgment interest should ordinarily be awarded absent some justification for withholding such an award. *See General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 657 (1983). In its answering papers to plaintiff's motion for prejudgment interest, defendant primarily reiterates its JMOL and new trial arguments. Defendant does not provide a sound rationale for withholding prejudgment interest on a remitted lost profits award. Bare allegations cannot suffice to counter controlling authority stating that prejudgment interest ordinarily should be awarded. *See IPPV Enterprises, LLC v. Echostar Communications Corp.*, Civ. No. 99-577, 2003 WL

²⁴The jury was shown a slide (slide 7) providing the \$578,969 and \$343,587 numbers. This slide is before the court, however, it does not appear to have been admitted as a trial exhibit. The testimony reflects "almost \$580,000" and "about \$340,000," respectively. With respect to the service contracts, Ms. Woodford rounded-down her testimony to "\$9.6 million."

723260, *3 (D. Del. Feb. 27, 2003) (citing *General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 655-57 (1983)). The court shall order defendant to pay prejudgment interest, compounded quarterly, at the prime rate.²⁵

²⁵The court (in its discretion) declines to apply prejudgment interest to an after-tax calculation of profits, as defendant asserts, or to apply a risk-free interest rate. “[I]t is not necessary that a patentee demonstrate that it borrowed at the prime rate in order to be entitled to prejudgment interest at that rate.” *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 939 F.2d 1540, 1545 (Fed. Cir. 1991) (citation omitted). Courts have recognized that the prime rate best compensates a patentee for lost revenues during the period of infringement because the prime rate represents the cost of borrowing money, which is “a better measure of the harm suffered as a result of the loss of the use of money over time.” *Mars, Inc. v. Conlux USA Corp.*, 818 F. Supp. 707, 720-21 (D.Del. 1993), *aff’d*, 16 F. 3d 421 (Fed. Cir. 1993).